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Gas Journal

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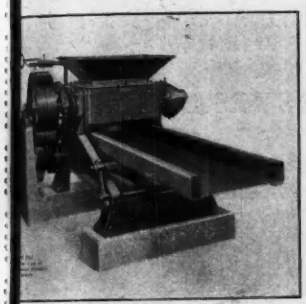
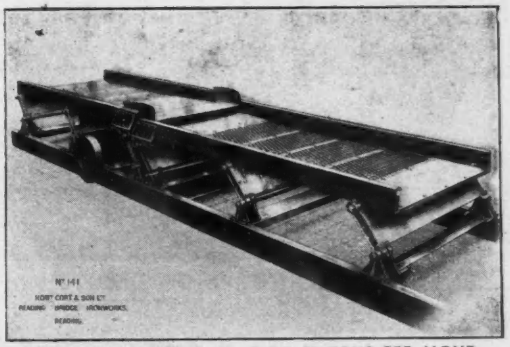


OKE CUTTING MACHINE WITH RECIPROCATING SCREEN



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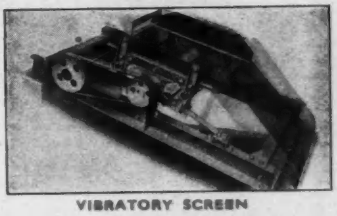

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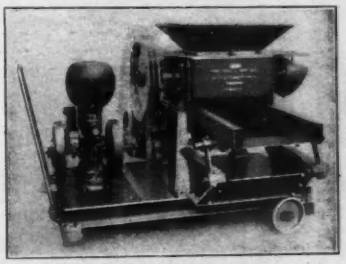

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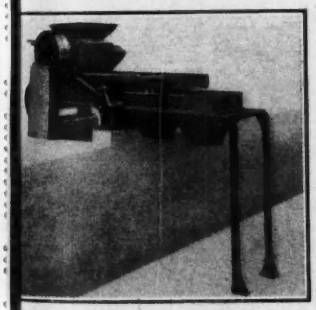

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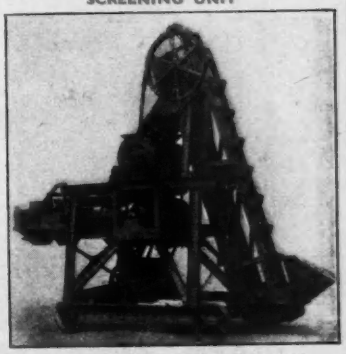

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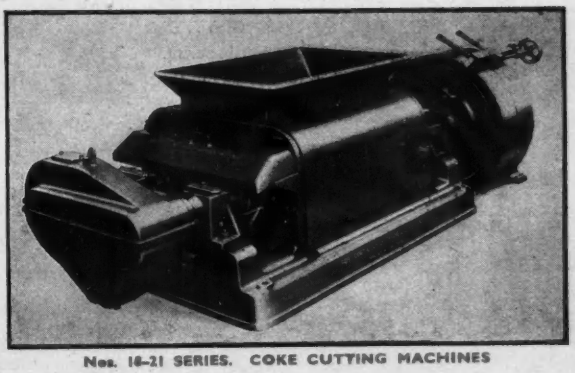

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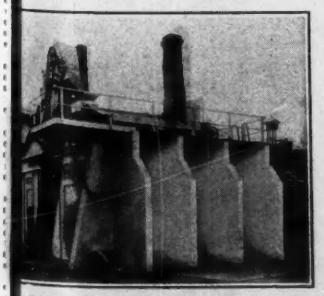

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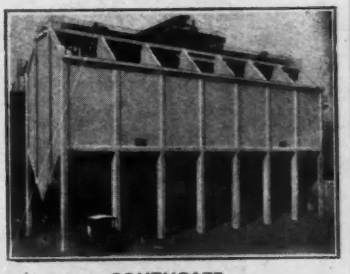

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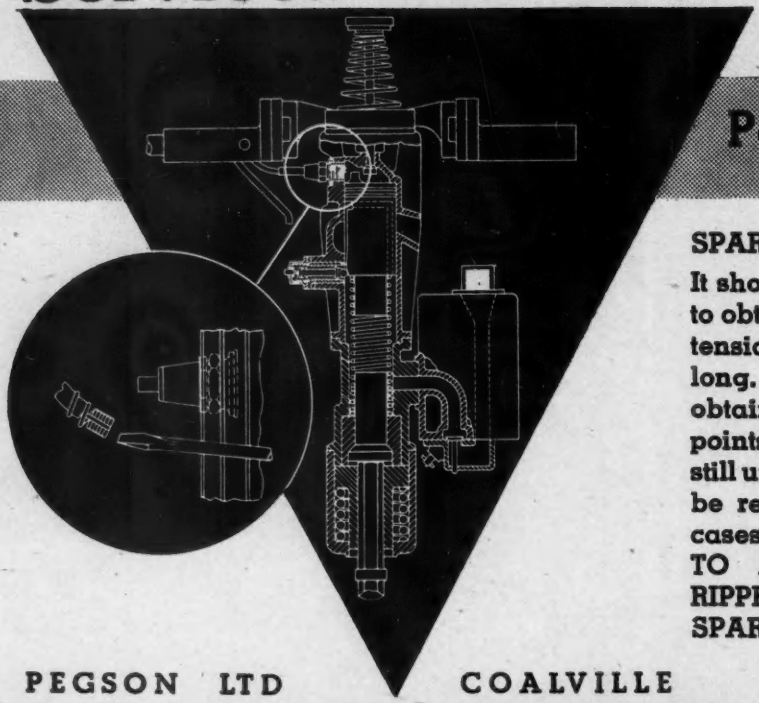

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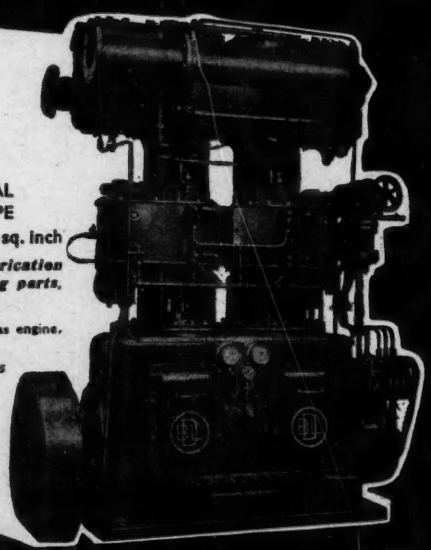

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CONTENTS

EDITORIAL NOTES

The Gas Research Board . . . 457
A Coke and Gas Industry . . . 457
Fact Finding and Facing . . . 457
Tar Products 458

Personal 458

Coal, Gas, Electricity 459
Commodity Control 459
Making Rubber Go Farther . . 459
Work of the Gas Research Board. By E. V. Evans, O.B.E. 460
"Of Things to Come." By Leopold Friedman 464

The Beveridge Report, with Special Reference to Pensions and Workmen's Compensation. By Henry Lesser, O.B.E., LL.B. (*continued*) . 471

Gas Products Prices 472
Gas Stocks and Shares . . . 472

THIS WEEK'S ADVERTISERS

	PAGE
Alder & Mackay, Ltd.	S2
Averill, C. R., Ltd.	449
Baird & Tatlock (London), Ltd. ...	453
Bale & Church, Ltd.	474
Birmingham Electric Furnaces, Ltd.	S6
Blakeley, Firth, Sons & Co., Ltd.	474
Braddock, J. & J....	465
British Vacuum Cleaner & Engineering Co., Ltd.	450
Clapham Bros., Ltd.	448
Cart, Robt., & Son, Ltd. ...	Cover I
Cowan, W. & B.	Cover III
Cox & Danks, Ltd.	S5
Crossley, Bros.	450
Crookston, S., & Co.	S7
Dempster, R. & J., Ltd.	447
Dempster, Robert, & Sons, Ltd.	462, 474
Dispenser, Ltd.	453
Donkin Co., Ltd. (The Bryan)	Cover II
Ether, Ltd.	S4
Gas Meter Co., Ltd. ...	Cover IV
Gas Purification and Chemical Co., Ltd.	473
Glover, Thos., & Co., Ltd. ...	456
Goodall, Clayton & Co., Ltd. ...	473
Grant & West, Ltd.	474
Harris & Pearson, Ltd. ...	Cover IV
Harrisons (London), Ltd	473
Holmes, W. C., & Co., Ltd. ...	S1
Horden Collieries, Ltd.	473
Humphreys & Glasgow, Ltd. ...	454
Keith Blackman, Ltd.	S8
Keith Piercy, Ltd.	451
Kleenoff Co.	S7
Le Bas Tube Co., Ltd.	452
Londex, Ltd.	S6
Main, R. & A., Ltd.	468
Mavitta Drafting Machines, Ltd.	473
Menno Compressed Air Greasecup Co., Ltd.	S7
Mewburn, Ellis & Co.	474
Milnes Meters, Ltd.	S6
Parkinson, W., & Co.	456
Pass, E., & Co., Ltd.	S5
Peckett & Sons, Ltd.	472
Peebles & Co., Ltd.	S3
Pegson, Ltd.	Cover II
Radiation, Ltd.	466, 467
Reavell & Co., Ltd.	S7
Saunders Valve Co., Ltd. ...	S6
Siebe, Gorman & Co., Ltd. ...	473
Spencer (Melksham), Ltd. ...	S8
Smith, Thos., & Sons (Rodley), Ltd.	S7
Strachan & Henshaw, Ltd. ...	474
Sutherland Meter Co., Ltd. ...	S4
Stringer Bros.	S7
Technical Institute of Great Britain	474
Trotter, Haines & Corbett, Ltd. ...	473
Tully, Sons & Co., Ltd.	S5
Visco Engineering Co., Ltd. ...	S3
Wakelin, F. H., Ltd.	474
Walker, C. & W., Ltd.	S2
West's Gas Improvement Co., Ltd.	471
Williamson Cliff, Ltd. ...	Cover IV
Woodall-Duckham Co.	461
Wright, Alex., & Co., Ltd. ...	455
Trade Cards	472
Appointments Vacant	474
Educational...	474
Miscellaneous	474
Patents	474
Plant, &c.	474
Plant, &c., For Sale	474
Publications...	474

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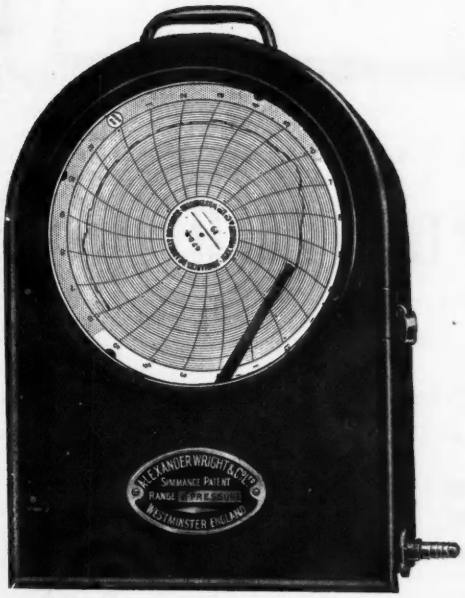

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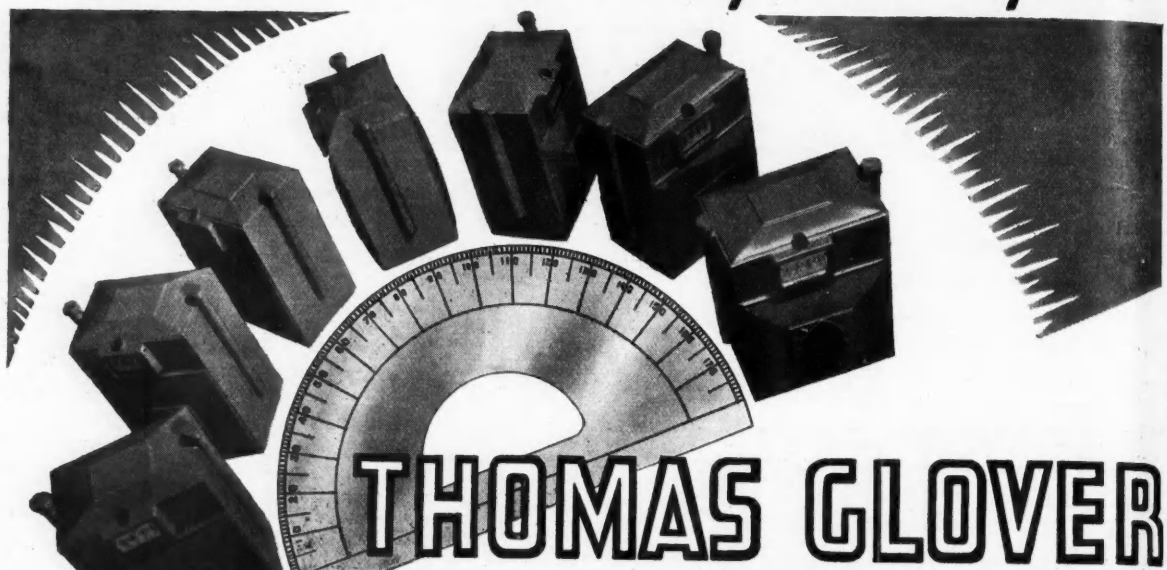

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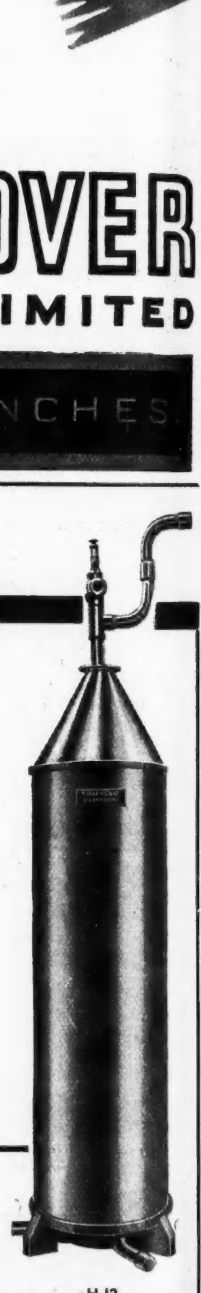

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GAS JOURNAL, APRIL 14, 1943

VOL. 241 95th YEAR No. 4169

EDITORIAL NOTES

THE GAS RESEARCH BOARD

ON Friday last the curtain concerning the activities of the Gas Research Board was well and truly lifted by Mr. E. V. Evans, President of the Institution and Chairman of the Board, in an Address of first moment to the North British Association of Gas Managers; and we think that the developments which have taken place swiftly during recent months and even weeks will be hailed with general satisfaction coupled with a sense of relief by the Gas Industry. The cold-storage policy has been replaced by vigorous action which appears to us to augur well. The story is unfolded clearly by Mr. Evans on later pages, and there is no need for us to repeat it here. We think that the organization has been planned with vision in a somewhat difficult jig-saw, that definition has been given—and none too soon—of the fields of work of the State-aided fuel research associations, of which the Gas Research Board is now one, and that the means for effective co-operation between them all has been admirably thought out and established. To our mind one of the happiest features is the setting-up of a Co-ordinating Committee of the fuel research associations, including, of course, the Fuel Research Board, under the Chairmanship of Sir Harold Hartley—surely a wise step. Again, we can only regard the choice of Dr. J. G. King as Director of the Gas Research Board as a happy one. Well known to the Gas Industry, the technical literature of which he has enriched, Dr. King has long and intimate knowledge of the art and practice of a Government research body, and his team-work experience will no doubt prove invaluable. We feel sure the Industry will wish him well in his new task. And we regard the strengthening of the Council of the Board by the nominations of Sir Lawrence Bragg, Professor C. G. Douglas, and Mr. R. O'F. Oakley as being both important and fortunate. When the organization, with its joint assistant directors (the appointment of Dr. F. J. Dent was announced in the "JOURNAL" last week), gets completely to work, our Industry will be justified in expecting from it much help and guidance.

But Mr. Evans was at pains to ask us not to overestimate the part the Gas Research Board can play in the development of the Industry. The Gas Industry must be prepared to interpret and apply its work. And we would underline Mr. Evans's plea that gas undertakings and the manufacturers of plant and appliances—who, in the immediate pre-war years were spending annually £400,000 on research—should not regard the establishment of the Board on its new basis as excuse for any slackening of individual effort in the investigation of day-to-day problems. With these provisos, however, the path seems to us to be better paved towards closer co-operation generally and towards accelerated progress in anticipation of post-war needs.

A COKE AND GAS INDUSTRY

THE Liverpool Gas Company has to such good effect paid attention to the preparation of coke—its work in this connexion for several years prior to the war is well known—that we were not at all surprised that Mr. W. Fletcher, in his Presidential Address to the Manchester District Association, should prophesy that the Gas Industry's solid smokeless fuel may become of importance equal to if not greater than that of gas itself in a properly devised national fuel policy. Liverpool knows from experience that expenditure of time, energy, and money on the upgrading of coke is a paying proposition; and it is obviously in the national interest. There are, of course, two methods of attack on the problem—the one the supply of a relatively incombustible fuel for use in appliances specifically designed for it; the other the supply of a combustible fuel which will burn satisfactorily and smokelessly in the ordinary open grate. Mr. Fletcher spoke enthusiastically of the latter alternative, basing his comments and opinion on Liverpool's success with "Dryco," the mounting sales of which pre-war were proof sufficient of the demand for such a fuel. On the other hand, we think he showed undue pessimism in regard to the former alternative. We foresee after the war improved coke-burning appliances which will meet with popularity—that is, of course, assuming that we market a graded product of uniform quality, determined in the first instance by the supply to the Industry of suitable coal, a matter which must claim attention in any reasonable national fuel policy. In any case, accompanying the supply of a graded coke we have the production of breeze, disposal of which Mr. Fletcher views with concern. We must, he said, see that a steady market for it is developed, with which we agree, but we do not share his concern. Surely the Gas Industry itself has a major market for breeze. We discussed this in the "JOURNAL" of Feb. 3 last in relation to the design of carbonizing plant and the amount of coke used in the gas-making process, when we suggested that attempts to justify heavy coke consumption were often made on the grounds that the coke consumed is recovered as steam from the waste heat. We asked whether this could be regarded as an efficient method of turning heat into steam, adding: "If a certain production of waste heat is unavoidable, by all means turn it into steam, but do not let us go out of our way to make waste heat. If the steam produced is insufficient, raise the extra steam in independent boilers fired by coke breeze." Working along these lines would not only raise efficiency, but would go a long way at all events to solving any breeze problem.

The Address by Mr. Fletcher—we published it in full in last week's "JOURNAL"—was not by any means confined to the question of coke preparation and sales, though this theme was deservedly prominent. It surveyed many matters from what we may term the practical angle, including the advisability of further mechanization of gas-works to eliminate heavy manual labour and its attendant difficulties, which are more likely to be accentuated than reduced after the war, the possibilities which undoubtedly exist and have been strongly emphasized in recent months of fuel economy in gas production, the need for concentrating on service *via* a gas supply of unvarying characteristics, the desirability of collaboration in research with other fuel interests, and the importance of offering adequate salaries to recruit to the Industry's ranks the right type of personnel. We dealt with the salaries question in our issue of March 10 in more optimistic vein than has been possible for some time. We feel sure that considerable headway is being made, and it was appropriate that Mr. Fletcher should refer to the work which has been pursued in this direction by "a Past-President of The Institution of Gas Engineers and a member of the Manchester Association"—Sir Frederick West.

FACT FINDING AND FACING

THERE will be considerable divergence of opinion as to the proportion of the best brains in the country among those prominent in politics, but in no case would the figure be very high. We think there will be general agreement with this comment of Mr. G. S. Garland in his Presidential Address this month to the Institution of Chemical Engineers. But the general attitude of scientific men to politics has wrongly been one of indifference, coupled maybe with a feeling of superiority to those whose cherished apparatus is the golden or the strident voice, whose laboratory is the hustings, and whose raw material is the feelings and beliefs of their fellow citizens. The point remains, however, that politics decides every phase of our activities; the time for a delicate disdain of politics by men of science has long since passed. Industries must, as industries,

know facts about themselves, and be able to present these facts in an effective manner to Government departments. It seems clear that the essential first stage of the solution of post-war problems is that of finding the facts. The Ministry of Fuel and Power had demanded relevant facts from the fuel industries, including, of course, electricity. A few weeks ago, as we mentioned in our issue of March 24, it gave the Gas Industry six months to put forward proposals based on facts; we discussed in the same issue the machinery which has been established to this end.

However unpleasant the process, we must grapple with facts. Mr. Garland, as a realist, suggested that our position as regards the minerals needed in bulk by manufacturing industry is probably worse than that of any other great nation. We have acquired the habit of making the comforting assumption that the minerals found in the British Empire, added to what we have in this country, make up a sufficient percentage of the world's total resources to render us relatively independent. Yet the Empire has only some 1.8% of the world's petroleum, 5.6% of pyrites, 5.2% of sulphur, 8.3% of bauxite, and 0.5% of potash. We have in this country a certain amount of coal, but it is less than 3% of the world production. It is our most important raw material, but technical men cannot pride themselves on the way we have used the great bulk of it. We have regarded coal, not as the most important source of carbon compounds, but as a combustible for the generation of heat and power—for the most part inefficient generation. Petroleum is equally with coal a source of power or a raw material for the carbon compounds which are the basis of plastics and much chemical and synthetic manufacture. In 1938 the American petroleum industry was employing over 5,400 scientific workers. Research has been largely responsible for the growth of the industry. In our own country research on coal has been relatively insignificant in volume, and we think we are right in saying that most of it has been carried out by the Gas Industry. Facts and comparisons such as these are unpalatable but cannot be set aside.

We can, however, take comfort in the fact that our country has always been in the forefront, as regards quality, of fundamental scientific research. We have had and we still have plenty of raw material in this respect. That we have not reaped the full benefit of our own fundamental discoveries has been due to the fact—another fact—that the application of our own researches to practical needs has on several occasions been left to the technicians of other nations. To what extent this has resulted from lack of co-operation and understanding between scientist and politician we do not know, but the lack must have had a considerable bearing on the situation, and the moral seems to us obvious. Despite the fact that our coal production is less than 3% of world total, our industrial greatness has been built on the wasteful use of coal. Coal remains the principal basis of our chemical industries. But we should and must cut out the waste. We should and must treat our coal before use. Scientists should by the several means within their power influence the golden or strident voice of the politician towards this end, so that the feelings and beliefs of their fellow citizens may be sharpened and moulded accordingly to the benefit of the nation.

Tar Products

The annual report of the Association of Tar Distillers (*ante*, p. 429) makes encouraging reading, and it is good to know that the work of the Coal Tar Bituminous Products Sub-Committee has opened up many new uses in connexion with constructional work. Properly developed in actual production and treated as carrying a considerable measure of responsibility on tar distillers to produce satisfactory material and ensure the proper servicing of the market, this new field offers opportunities of a first-class and permanent nature. The Association is actively represented on the B.S.I. Committees which are preparing specifications for various tar products used as or in constructional materials. It is co-operating in carefully planned field trials in directions of use for which there is insufficient past experience. The Association's interest in the activities of the B.S.I. during the year under review have centred round the preparation of specifications for tar products used in substitution for asphaltic bituminous products. Specifications for pitch mastics for flooring and damp courses, and for black paint (tar base) for use on iron and steel, were issued during the year, and other specifications are in course of preparation.

Personal

Sir WILLIAM FAWELL ASCROFT, D.L., J.P., a Director of the Preston Gas Company, has been appointed High Sheriff of Lancashire.

* * *

Mr. JOHN BATEMAN, Works Superintendent, Lincoln Gas Department, has been appointed Superintendent of the Neepsend Works of the Sheffield Gas Company.

Mr. J. S. MARSHALL, of the Bradford Road Works, Manchester, has been appointed to fill the vacancy at Lincoln.

* * *

Mr. S. H. LAWRENCE, A.M.I.Mech.E., the newly appointed Engineer and Manager of the Ellesmere Port Gas Department, has now taken up duties. Mr. Lawrence has for the past six years held the position of Deputy Engineer to the Nelson Corporation Gas Department.

* * *

Mr. A. E. WILLIAMS, M.Inst.C.E., has been elected an additional Director of the Commercial Gas Company. Mr. Williams retains the office of Chief Engineer of the Company.

* * *

Brief reference was made in our report last week of the Manchester Association meeting to the retirement of Mr. H. BURTON, Shipley, from the Hon. Secretaryship. He has filled this position for six years with outstanding success, following the late J. Bridge, of Elland, who had set a very high standard for the office.

Mr. Burton is succeeded by Mr. THOMAS HAWORTH, Darwen, who is at present Secretary of the Lancashire Commercial Section.

* * *

The Lord President of the Council has appointed Mr. R. O'F. OAKLEY, O.B.E., to be Assistant Secretary in the Department of Scientific and Industrial Research. Mr. Oakley joined the administrative staff of the Department in 1930, after previous Government service in the Patent Office and service in the Royal Army Ordnance Corps during the 1914–18 War. He became Assistant to the Director of Fuel Research in 1938, but since 1940 his services had been lent to the Ministry of Home Security as Deputy Chief Adviser, Research and Experiments Department.

* * *

The Lord President of the Council has appointed Mr. A. PARKER, D.Sc., F.I.C., M.I.Chem.E., to be Director of Fuel Research in the Department of Scientific and Industrial Research. Dr. Parker joined the staff of the Department of Scientific and Industrial Research in 1928 as Assistant Director of Water Pollution Research. He had previously been engaged for some ten years on research for the Gas Industry, including full-scale experimental work, as Senior Research Chemist to the Joint Committee of the University of Leeds and The Institution of Gas Engineers. Since the outbreak of war he has been Acting Director of Water Pollution Research. He has served for many years on the Council of the Institution of Chemical Engineers and has been a Vice-President of the Institution.

In the Lincoln "Wings for Victory" week, £15,000 was invested in War Bonds on behalf of the Gas Undertaking.

The Industrial Gas Centres Committee will meet at Gas Industry House at 9.30 a.m. on Thursday, May 6.

The Spring Meeting of the Midland Association of Gas Engineers and Managers will be held at Wolverhampton on May 27.

A Meeting of the Manchester and District Junior Gas Association will be held on April 17 at the College of Technology, Manchester, when Mr. A. Healey, of Oldham, will read a paper on "Toluene and the Gas Industry."

A Year Ago the Leamington Priors Gas Company entered all their horse and motor-lorry drivers in the Royal Society for the Prevention of Accidents "Safe-driving Competition." All who were employed as drivers throughout the year 1942 came through with a clean record of freedom from accidents. The Society has awarded them diplomas to this effect.

The Glasgow Gas Committee has decided to adhere to the practice of charging meter rents to consumers using less than 1,000 cu.ft. per quarter, subject to a discretionary power on the part of the management. The Ministry of Fuel and Power suggested that the policy should be reconsidered with a view to discontinuing the practice for the duration of the war. Reporting on the position, the Manager of the Department emphasized that the charge was not enforced where consumption was reduced by fuel economy, and also that it was not levied in cases of hardship. He stated that the charge was imposed on consumers who had never been large users of gas and on those who were using gas as a stand-by.

Coal, Gas, Electricity

On March 25 an Address was given to the Fuel Luncheon Club by Sir John Dalton, Manager and Secretary of the County of London Electric Supply Company, but whose chief present activities are as Regional Fuel and Power Controller for London and the South-Eastern Regions. He was welcomed by Sir David Milne-Watson, President of the Club, who presided.

Sir John Dalton, in the course of his remarks, expressed the hope that with our scientific manpower and scientific ability and sufficient technical resources, we can do here for coal what they have done for oil in America. He went on to say:

"It seems there is a large number of Study Groups and Committees which are planning the future of the fuel industry for us, and I am forced to the conclusion that these various people, who may be extraordinarily good in their own special fields, have failed to grasp some of the fundamentals of fuel and power supply. They have a tendency to think of all post-war problems in terms of social science—whatever that may mean.

"Now the scope of the domestic market for heat and power accounts for some two-fifths of our consumption of coal. An enormous amount of coal and an enormous amount of revenue is involved. This revenue is effectively controlled by the types of appliance installed in houses at any given period, and the market for these appliances is very stable, as the life of them ranges from 10 to 20 years. Therefore if, as is anticipated, there may be an enormous number of new houses built after the war, the selection of services in these new houses will have a decisive influence on the trend and nature of consumption for many years thereafter.

"Therefore, my appeal is directed to the necessity of some balance between the use of coal, gas, and electricity in this domestic heating market which will be most advantageous in the national interest and most advantageous to the three industries concerned. The only way to determine such balance is for the three industries concerned to get together and arrive at a scheme to achieve such a balance, and then to get our Ministry to bless it on national and economic grounds. Look for a moment at the economics of the house coal position. It is an influencing factor on the whole problem. It comprises some 40 to 50 million tons of coal which attracts the highest prices. House coal commands pithead prices some 4s. per ton higher than the price which is paid for gas and electricity coal. This is equivalent to over £9,000,000 per annum, which is a sum greater than the whole realized surplus of the coal industry out of which all wages above the basic minimum, and profits, have to come. It seems clear, therefore, that any disturbance of any considerable proportion of the house coal trade by gas or electricity must throw more than a spanner into the economics of the coal industry. It might indeed increase the price of gas and electricity coal.

"Apart from this economic factor I think it is about time that we gas and electricity people frankly admitted that the coal fire in the house is a prejudice to which every Britisher is entitled. I think there is nothing which our gas and electricity experts have or can produce which can touch the comfort and joy of an open grate burning raw coal. The house coal consumed in open firegrates must be of the order of some 50% of the whole coal used by the domestic market in all forms for heating and power, and I am of the opinion that neither the electrical industry nor the gas industry could take over, or even divide among themselves, this large heating load from the economic point of view. It follows that the house coal trade is indispensable not only to the coal industry, but also to the gas and electric industries.

"It is a fact, speaking now only for the electricity industry, that we are embarrassed by the uncertain and fluctuating load due to space heating as the result of the cold spells during the winter. Some idea of what this snap heating load means is given when I say that overnight at the end of the very cold spell in the early part of 1942 the electrical load of the industry dropped just about 1,000,000 kW. as the result of the sudden cessation of the cold spell. I was interested during that cold spell to assess as nearly as I could the excess consumption of gas and electricity coal due to this snap heating load, and my estimate was that the gas industry required 25,000 tons per week more coal and the electricity industry required 79,000 tons a week more coal to meet this heating load. It appears obvious that if this load grows much more and gets out of hand, both the gas and electricity industries will be involved in further capital expenditure on plant to meet a peak which will only occur at very infrequent intervals. One of the fundamental points to be pressed for with building authorities in respect of all new building plans should be adequate storage for house coal."

During their visit to Lincoln the Duke and Duchess of Gloucester inspected the various Civil Defence Services. Among those presented were the City Gas Engineer (Mr. G. Wright) and Mr. A. Raby, senior mainlayer, 43 years' service.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in the "Journal" should not be taken as an indication that they are necessarily available for export.

Commodity Control

As a supplement to their Emergency Legislation Service, Messrs. Butterworth & Co. (Publishers), Ltd., have published an important book which reviews in narrative form the whole of the Government's control of commodities other than food, whether by Statute or by Rules and Orders. The price of the book, *Commodity Control*, is 15s. plus postage.

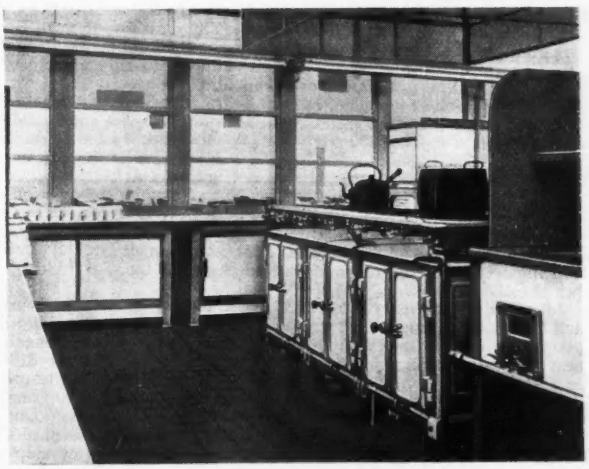
The narrative is supplemented by Appendices, of which not the least important is a complete list of all Orders and Regulations imposing, applying, relaxing, or removing controls, arranged alphabetically under the commodities or groups of commodities affected. Two advantages are claimed from this method of treating the subject. In the first place—and this is a point which may possess a great appeal to the busy and harassed industrialist—it can hardly be claimed that clarity of expression is an outstanding feature of a great part of emergency legislation, and the adoption of the narrative style enables the authors to present the effect of those provisions in a language more akin to that in use in everyday circumstances. Perhaps, however, of more importance is a second advantage—namely, that in stating in the simplest possible language the effect of the provisions of emergency legislation, it is possible to incorporate the effect of the many amending Orders which so often succeed the original provisions, and the combination of which can often harass even a specialist in the particular subject.

The book is written by J. Bray Freeman, Barrister-at-Law, and N. Howarth Hignett, Solicitor of the Supreme Court.

Making Rubber Go Farther

Before the rubber shortage became acute the Gas Industry used a good deal of rubber and for many months it has been looking for substitutes, or for some means of making the available supplies go farther, for conveyor and projector belts, the sealing of purifiers, the jointing of pipes, and other purposes. The rubber industry, too, has carried out intensive research, and one result has been the production of "Relt" by the Empire Rubber Company, Dunstable, in association with the Bury Felt Manufacturing Company, Bury. "Relt" is in effect a new rubber moulding technique wherein the mouldings consist of a core of felt surrounded by a "corral" of rubber. The new process, for which patent applications have been made, is said to save as much as 75% of raw rubber in some types of mouldings.

On one particular type of hollow cylindrical moulding originally made in a rubber mixture there has been a saving of 53% of raw rubber, or nearly 1¾ tons on a run of 100,000. The co-inventors claim that variations in the degree of resilience are more easily secured, since the felt core can be provided in a range of different degrees of hardness. Originally the felt core was made to conform only roughly to the shape of the final moulding, but it can now be pre-formed to the exact shape, although slightly smaller than the final product, with a still greater saving of rubber and more uniform resilience. The hardness and resilience of the felt core are now more variable and the products more nearly conform to the standard of mouldings produced wholly from rubber mixtures. The process is applicable not only to shaped products, but also to ply sheeting. Further developments are in hand; already "Relt" is being used where resistance to oil and petrol is necessary, and in other applications we are told it has been found more successful than other materials because it is waterproof.



An Installation by Radiation Ltd. in a Canteen at a large Engineering Works.

WORK OF THE GAS RESEARCH BOARD*

By E. V. EVANS, O.B.E.

YOU have asked me to speak upon the Gas Research Board. It has, in fact, been a long-standing arrangement with you, and it happens that the moment is most opportune to deal with a general description of the organization of the Board, of some of the work it is doing, and of what we hope to do when times generally become easier. It is opportune because it is only within recent months that the Board has become affiliated with the Department of Scientific and Industrial Research and is receiving an appreciable grant from the Government. It is now a State-aided Research Association having one object in view—that is, to give useful service to the Gas Industry.

The Department has nominated three members to serve on the Council of the Board and to represent the Government. Those three members are: Sir Lawrence Bragg, F.R.S., Cavendish Professor at Cambridge ; Professor C. G. Douglas, F.R.S., a medical man who holds the Chair of General Metabolism at Oxford; and Mr. R. O'F. Oakley, the Assistant Secretary of the Department of Scientific and Industrial Research.

I expect it will already be known to you that at the last meeting of the Council a Director of the Gas Research Board was appointed. And that the Director is none other than Dr. J. G. King, who is so well known to you. To me it seems remarkable that we should have to go to Scotland to find our Director. To you it may appear to be in the natural order of things.

The Director will have as his senior assistants a chemist—who should be what one may call a "coal processing" chemist, and a physicist. The appointment of a physicist will have to wait until more physicists become available, but we have appointed as Joint Assistant Director, Dr. F. J. Dent, who has proved himself to be an outstandingly sound investigator in the field of the processing of coal.

When this organization gets completely to work the Gas Industry will be justified in expecting considerable help and guidance from the Board.

Now all this sounds most progressive, as indeed I think it is, but we must be careful not to over-estimate the part the Gas Research Board can play in the development of the Industry. By itself the Board can do very little, for the Gas Industry must be prepared to interpret and apply its work. In passing, may I say that by " Gas Industry" is meant not only the gas undertakings, but the manufacturers of gas-works plant and of gas-burning appliances. It is useless for us of the Gas Industry to open our eyes and shut our mouths (or whatever it is) and see what the Gas Research Board will send us. We must do a good deal more than this. We must possess in the Industry not only men capable of understanding and interpreting modern research, but men in the gas undertakings and elsewhere themselves investigating their day-to-day problems, men in close touch with the Board, men who will transfer to the Board work of fundamental nature which would be better solved in a national way. You see, I sometimes get a little impatient with those who perpetually cry "Let us have more research! Let us spend more on investigations!" and do not realize that the more research done the more men must there be inside the Industry to interpret and develop it. There is already an immense amount of knowledge and research sleeping quietly in the archives of technical societies or in the technical Press that has never been used or applied. A better slogan would be, "Let us apply to industry more and more of the research work already done."

What I am saying is that the Gas Research Board can do little unless *pari passu* our Industry creates an organization capable of understanding and applying its work. The creation of such an organization is a matter to be fostered by the Institution, and in this the Gas Engineering Advisory Boards with their regional control laboratories will play, I hope, a predominant part.

The association of the Gas Research Board with the Department of Scientific and Industrial Research will not only bring an appreciable monetary grant from the Government, but will link up the research work of the Gas Industry with that of other branches of the industry and of the Government's own research organizations.

A Co-ordinating Committee of the Fuel Research Associations under the Chairmanship of Sir Harold Hartley has been formed, and upon this the Gas Research Board has nominated two representatives.

Significant though all this may be, we must not under-rate the value and importance of the research and development the Gas Industry has already achieved.

I fear the Gas Industry is not accustomed to beat its own big drum and I am only beating it now because, upon learning of the one million pounds sterling that the coal industry was intending to spend over the next five years, a certain section of our own Industry spoke disparagingly of our own effort. May I say, before the war our Industry was spending at the rate of at least two million pounds in five years upon research and development. Of course, I realize that the amount of money spent on research does not indicate the value of the results obtained. Yet we may be justly proud of our research and development work. Apart from economies arising in the manufacture of gas and coke due to a better understanding of the carbonization process and to the erection of more efficient gasmaking and water-gas making plants, development of gas appliances has enabled the gas user to obtain the same, or better results with one-third to one-quarter less gas. With an average yearly gas bill of £3 this means the possibility of saving a further 15s. to 20s. a year. All this does not take into account the greater convenience of modern gas appliances, the oven thermostat, the gas refrigerator, the multipoint and storage water heaters, and many other familiar appliances. Industry, too, has received great benefit from better design of furnaces and other equipment. Tar used for the construction and maintenance of roads has been changed in property to meet the increasing severity of the demands made by modern traffic. Coke has taken its place as a domestic smokeless fuel, and the gas-ignited solid fuel fire has solved the domestic problem of fire-lighting.

I say again we must never disparage the work that our Industry has done for itself in the past. And the contribution that will now come from the taxpayer is infinitesimal compared with that made by the Industry itself in the past.

Although The Institution of Gas Engineers and the University of Leeds have played an important part in the developmental work, a great deal, and I think the majority, has come from the individual effort of gas undertakings and of plant and appliance manufacturers. Please do not think that in future the Gas Research Board will do this work and that individual effort may slacken. I assure you it is quite the reverse. The Gas Research Board will occupy itself mainly with long-distance work. Work connected with the Gas Industry of the future. The newer methods of processing coal, or the nature of radiant heat suited to particular operations, or the study of flame, or the generation of power from explosive gases. And here I return to my original theme. Our Industry must equip itself to do more and more day-to-day research and development work, depending upon the Gas Research Board to co-ordinate—to a reasonable degree—the work and taking over those problems of long distance and fundamental work that are best solved in a national way.

The Board will in time, I trust, possess its own experimental station and its own information bureau. It will be the servant of the Gas Industry, and here again you will remember that the Gas Industry is not confined to gas undertakings. Work which can be better carried on at a University where there exists a particular expert school of thought and experience (as at Leeds) will be placed at that University. It may well be that the Board will place certain of its problems in the laboratories of gas undertakings or the laboratories of plant or appliance manufacturers. If such a procedure were adopted the cost would be borne from the funds of the Board, and the result of the investigation would be made available to its members.

I am hoping that the organization set up under war conditions, and represented by the Regional Gas Engineering Advisory Boards, may find a permanent place in the structure of the Gas Industry. Should this prove to be so the establishment of regional servicing laboratories would appear to be a natural and desirable development. Such laboratories, which would be under regional control, might be expected to assume responsibility for the testing of plant, processes, and appliances, as well as dealing with the day-to-day problems of the regions. With work of this nature the Gas Research Board would not normally be concerned (but should maintain such contact as would ensure effective co-ordination), except to ensure that new knowledge so gained should be made known throughout the Industry, and that problems arising in the course of the work were adequately investigated. This might on occasion require that the Board should accept responsibility for special tests of processes or apparatus, but it is undesirable that any large proportion of the Board's resources should be so expended. The Board, through the work of its own staffs, and by the support of researches conducted in suitably chosen laboratories, should elucidate the fundamental principles of coal processing, and of the utilization of all products from coal processing. The practical application of these principles is more likely to be made effective by the work of the laboratories of the gas undertakings in collaboration with the technical staff of plant and appliance manufacturers. Nevertheless, the Board would not refrain from undertaking development work to any required extent if it seems to be in the best interests of the Industry to do so.

Although this matter of organization may be of interest to you, I believe you will find greater interest in a brief consideration of one or two of the technical ideas which have formed the background of the work of the Board in recent times. In presenting these technical ideas to you in a manner which I think is best understood by engineers whose main occupation in life is the wartime production and supply of gas, you will, I am sure, understand that it is a personal interpretation and is not an official statement from the Council of the Board.

On another occasion I have said that there are four outstanding requirements of our coal-processing industry that should tend to allow gas, or gas and coke, to play a more and more important part

* Address to the North British Association of Gas Managers, April 9.

in our service to the nation and to the consumer. These requirements are:

(1) To be able to deal with a much larger range of coals and not be dependent upon a caking coal of low ash content.

(2) In making gas to produce such a proportion of coke as may be sold advantageously.

(3) To produce a tar that can be readily hydrogenated to liquid fuels required for internal combustion engines.

(4) To carry out the process of coal treatment in a vessel self-heated internally, thus avoiding external heating with its low efficiency and the production of waste products of combustion.

The work of the Board is directed towards evolving processes that will conform to these requirements. As practical men you might say: "The Industry wants a process which will make the cheapest and best gas possible." Well that, of course, is what we are aiming at, but you can only evolve the cheapest process by first studying the factors that are likely to cheapen the process. I can assure you that we are a long way from being in a position to do business with the practical man.

You would agree that requirements (1) and (2) would be achieved if we possessed an efficient complete gasification process and it is possible that a process can be devised to incorporate also the third and fourth requirements.

When a chemist considers for the first time the complete gasification of coal, he thinks first of the producer gas process, which is one of high thermal efficiency, but one which yields a gas of low calorific value. There are difficulties, therefore, in storing and distributing the gas. This is due to the fact that with every molecule of oxygen we use to gasify the coal there come four molecules of unwanted nitrogen to be blown into the producer, heated in the fuel bed, cooled, purified, and passed through all the various steps that lie between the coal and the consumer's burner.

He next turns his attention to steam, which contains oxygen in companionship with the really valuable heating gas, hydrogen. To decompose the steam requires a considerable quantity of heat at a high temperature. Of course, when we make use of the residual heat in a coke charge while it is still in the carbonizing vessel, as occurs in vertical retorts, that heat is available for the production of water gas, but the amount of heat that we can obtain in this way is limited.

To produce water gas in the well-established processes, the heat required is supplied by burning part of the fuel. But here again, if the products of combustion of the fuel, together with the unwanted nitrogen, are excluded from the finished gas, as in the blow and run process, the overall thermal efficiency of the process is only 60%. That is to say, 60% of the potential heat in the carbon is recovered in the gas. Moreover, the calorific value of the gas is low; not as low as that of producer gas, but still lower than that of coal gas, and consequently it is a more costly gas to store and distribute.

Feeling dissatisfied with oxygen the chemist then considers the merits of hydrogen as a gasifying medium. Now the simplest gas resulting from the combination of carbon and hydrogen is methane, and he finds methane to be a most desirable fuel gas. It has a high calorific value, nearly twice that of coal gas, and should be cheap to handle, store, and distribute. As contrasted with water gas it liberates heat during its formation, and reactions producing it can therefore be self-supporting. The outstanding difficulty in the production of methane is that we have to pack two volumes of hydrogen into each volume of methane, which means that the combination is best achieved under pressure.

It is not surprising that the search for improved methods of gasifying coal has for many years been largely a search for methods of obtaining methane. In the ordinary high-temperature carbonization of coal about half the hydrogen contained in the coal substance comes away as free hydrogen, the remainder being evolved in combination with carbon. By care in control of carbonizing conditions, the amount of hydrogen that comes away in combination with carbon can be increased, and what is known as the hydrocarbon enrichment value is improved. But advances so far have been slow and small.

We should stand a much better chance of success in promoting the formation of methane if we could pass hydrogen under pressure over coal during its carbonization. But the practical difficulty of heating coal to 1,000°C. in a pressure vessel has been so great that the use of this method for the commercial production of gas has not seemed feasible until recently. To-day, however, we can see the possibility of such a process becoming practical, and the change in outlook is mainly due to the discovery of the ease with which hydrogen will react with coal under pressure.

In this reaction heat is liberated, and it is possible to bring about internal heating and carbonization of the coal by a reaction that produces the very gas we are seeking—namely, methane. Indeed, so successfully has this reaction been conducted on a laboratory scale that the whole of the carbon of coal has been converted to methane and gasified in that form. It is unlikely that we shall in practice need to carry methane production so far. If about half the carbon could be converted to methane we should need the other half for the manufacture of the hydrogen required to produce methane and to dilute the final gas to the usual calorific value.

The chemist now begins to see the possibility of complete gasification carried out with a high thermal efficiency and yielding a gas of acceptable calorific value. But the success of his process depends upon the production of hydrogen at a high thermal efficiency. Now the conventional method of manufacturing hydrogen is through the water-gas process, which we know has a relatively low thermal efficiency.

The Lurgi generator achieves the end we require. In this, oxygen and steam are passed through carbon containing fuel at a high pressure, say, up to 50 atmospheres. It is a combination of producer and water-gas generator operated without the admission of nitrogen. By eliminating nitrogen we eliminate also a large source of heat loss. It may be said that the power required for the production of oxygen is equivalent to a heat loss, as indeed it is, but this should be of the order of only 7–8% on the total thermal value of the fuel gasified.

By operating under pressure the thermal efficiency of the process is increased by virtue of the greater ease of recovering sensible and latent heat of undecomposed steam. And then the hydrogen, the volume of which is very large, is itself generated under pressure—thus avoiding compression.

I believe you have been given enough to think about on this question of the hydrogenation of coal under pressure. May I add that if the process is operated to produce tar, that tar is of a nature which permits it easily to be hydrogenated, and it may be said that by such a process all four requirements previously outlined will be achieved. That is, if ever we are successful in developing the process to the practical and commercially successful stage.

Before leaving the subject of coal treatment I should like to say that the advantages of using oxygen and operating under pressure are not confined to this particular combination of processes. Indeed the time may come when the output of gas from existing carbonizing plant may be multiplied several times. If Lurgi generators are installed to operate on gas-works coke, the hydrogen so made can be converted to methane by catalysis. A methane-hydrogen mixture of suitable calorific value can be produced in large quantity. This process of methane synthesis has been studied by the Board in conjunction with the Fuel Research Board, and I think it may be said that a decided improvement in the production of methane is possible by the use of pressure and of a synthesis gas generated with the thermal efficiency associated with a Lurgi generator.

Before closing, perhaps you will allow me to choose another of the several matters engaging the attention of our chemists. It is a matter which so far exists only in the form of calculations on paper, but has such far-reaching possibilities that it calls for experimental development at the earliest moment possible.

The ordinary internal combustion engine using coal gas as a fuel will, under favourable conditions, convert some 25% of the potential heat energy in the fuel to power at the crank-shaft. A Diesel engine, working on a compression ignition cycle, may show up to 40% thermal efficiency, and there were, before the present war, certain developments which aimed at increasing the efficiency of the gas engine to approach that of the Diesel engine by injecting compressed gas at the top of the compression stroke. The Erren engine was an example.

Now, if gas is produced under pressure this end may be attained more easily, because there is no need to compress the gas before admission to the cylinder and the energy of compression can be saved. We can go further. The hot crude gas from the pressure gasification plant contains substantial quantities of undecomposed steam and of carbon dioxide. If purified gas is required, both these would be removed, but for power production their presence is an advantage, as they too can add to the power available in expanding to the exhaust pressure. Thus the new gas engine would be operated at the outlet of the pressure gasification plant.

As I said, these ideas exist at present only on paper, but, by calculations made by Dr. Dent, they suggest that efficiencies of power production as high as 45% should be obtainable. If experimental work should demonstrate that these theoretical advantages can be realized in practice, the Gas Industry will be able to show striking advances in the efficiency of power production, and to generate electrica energy without the need to keep costly boiler plant standing by for peak demands.

Finally, Mr. President, may I address your audience as President of the Institution? One of the ends we wish to achieve by giving additional scientific status to the Gas Research Board is, in the after war, to induce into our Industry more and more young men who have been scientifically trained. They will, we believe, think it more worth their while to join us, and when they have joined us it is for us to encourage them to apply scientific methods to the control and development of our Industry.

Over Two Tons of keys were collected by the Gas Light and Coke Company in their recent salvage drive. The actual number of keys amounts to well over 150,000. Melted down they will provide enough iron to make 215 Bren guns or 20 500-lb. bombs, and enough brass for 45 tank telescopes, as well as 100 Infantry compasses, and 320 25-pounder shell fuses. Each of the Gas Light and Coke Company's showrooms had a display and, in addition, stores, schools, factories, and estate agencies were approached. In spite of previous intensive salvage drives, unsuspected hoards of keys were discovered and given up. The keys will be sold as Salvage and the proceeds devoted to the Red Cross and St. John Prisoners of War Department.

"OF THINGS TO COME"*

By LEOPOLD FRIEDMAN

MUMFORD in his monumental work, *The Culture of Cities*, referring to the development of hygiene, states: "Hygiene and sanitation were not unknown in other civilizations; what community could have survived the ordeals of close, permanent quarters, without a certain respect for their laws? But in our new bio-technic economy, hygiene occupies a commanding place; not merely does it mean public defence against disease; it means taking positive steps to make the whole environment favourable to health, animal joy and length of days."

A greater appreciation of cleanliness was evident even before the nineteenth century. The significance of cleanliness was recognized by medicine after 1870. The growth of industry with its attendant dirt and smoke had made earlier living conditions almost unbearable by the end of the nineteenth century. A bathroom for every family became a minimum requirement, and it is interesting to trace the development and ultimate acceptance of the minimum standards through the various Housing Acts.

Cities as we know them to-day are still from the biological point of view unnatural, health inimical, even life-destructive environments. The development of industry has caused the enormous increase of urban centres—the working place and home of the vast masses of workers, both manual and clerical—with smoke and dirt, noise and haste in attendance. In these areas the day's work starts in closely packed buses, trains, and underground carriages. It continues in airless, badly heated and ventilated factories and offices, followed again by standing or sitting closely confined with numbers of fellow workers in buses, trains, and tubes. The design for the day's living often finishes tn a cinema or crowded public-house. The greater part of the day is thus spent in surroundings deprived of the cleansing influence of sun and air. The mechanization of work has more and more eliminated natural physical exercise, leading to bad breathing and a slackening of the blood circulation, resulting in mass anaemia.

As one reaction, physical training and sport gradually developed and still further emphasized the need for hygiene and cleanliness of body and home. Parallel to this, a revolt against the filth and depression in overcrowded areas and a yearning for light, air, and cleanliness grew in momentum, ultimately forcing a hasty remedy which was deemed to have been found by segregating the dormitory area from the production area. The continuous growth of industry pushed these dormitory areas further and further afield.

The removal of the home from the centre of daily work meant still longer daily journeys and a further increase of the physical and mental strain. How far strain is harmful to health has not yet been fully realized, but certainly the vast number of nervous diseases hitherto unknown and the reasons for which are not yet fully recognized are the direct result of the present mode of city life, with its continual state of strain and tension, due to haste and worry, aggravated by a smoky, airless atmosphere. The famous surgeon, Kenneth Walker, has said: "If one looks at the faces of the passers-by in the streets one is almost certain to find that the predominant expression is one of concern and anxiety. Modern civilized man is still habitually concerned as to what he shall eat, what he shall drink, and wherewithal he shall be clothed. Chronic anxiety is another name for continuous fear, and this it would seem has a definite action on the body." Of course it has an action on the body, and we must plan for amelioration.

Great work has been accomplished in Manchester by Sir Ernest Simon, in York by Rowntree, in Birmingham by Cadbury. The satellite city has done much to bring fresh air, light, health, and happiness to a great many, or rather to take a great many to those desirable conditions. This development of itself, however, is only partly effective unless we recognize the basic difference between planning houses and the planning of homes.

Let us consider the housewife whose kitchen has been moved from the city to a suburb. She still has to perform her hard work—her very hard work—in badly planned houses and kitchens, inadequately ventilated and lighted and mostly without suitable equipment. The whole of her existence is tempered by an atmosphere of haste, a continual fear that "the job will not be finished in time." No efforts should be spared to mitigate this feeling in the home. To cite one instance: although we pride ourselves that this is the age of labour saving, of simplification of life and elimination of unnecessary drudgery, more than 60% of the people in this country have still to carry hot water to the bath from an inadequate source. The "garden city" consisting of houses with unplanned kitchens and bathrooms can be compared to a case of rotten apples packed in cotton wool.

Mistakes in the past may largely have been due to a tendency to consider the house as the primary unit. Little or no attention was paid to distribution and allocation of space for the various functional purposes. Normally the equipment was chosen and installed by the landlord or builder, the first object being to catch the eye and sell the house. Competition among speculative builders contributed a little to raise the quality of installations, but hardly anyone knew or cared enough about the suitability of the equipment. The physical, psychological, and physiological needs of the mother and children who use the home and grow in it were either neglected or received inadequate consideration. Perhaps in many instances little more could have been done, owing to general lack of knowledge and scarcity of information.

The same criticism may be made of flats which grew parallel with the dormitory districts. In these dwellings accommodation for the maximum number of people in the smallest space was the aim which many flat designers wrongly thought would best be achieved by reducing the kitchen and bathroom space to the barest excusable minimum. Only when it was found virtually impossible to use the conventional equipment in these kitchens did planning of space for its most economical use and the design of built-in equipment commence This certainly raised the general standard of kitchen and bathroom layout, and was one of the many reasons for an increasing number of families favouring this form of " home."

Most of our mistakes can be traced to what we to-day almost daily refer to as "lack of planning." Perhaps a few words in explanation of what in my opinion is the meaning of the word "planning" will not be out of place. One may consider that this is a new fashion, fetish, or obsession. One may even ridicule it, for it is obvious that planning is nothing new and was, after all, always a part of any enterprise based on reason and foresight. To-day, although we use the same word and so frequently, we understand something rather broader. The difference lies in the sphere of planning.

To-day we understand planning to be an endeavour to correlate our activities with those of other spheres and to subordinate them to the common interest, in order ultimately to achieve the highest overall efficiency, taking the common weal or commonwealth in its truest sense as the denominator. Translate this into the terms of the problem with which we are directly concerned. It means that the town planner, the architect, the builder, the equipment manufacturer, and the public services must collaborate, keeping in mind that their aim is, to put it succinctly, the building of homes and not houses.

The architect in the past, working unaided, found himself in a difficult position. He had to master so many things. Here are the salient features he had to tackle:

1. Design and aesthetics—anticipating sensitivity to environment and historical influences.
2. Planning—requiring a full knowledge of contemporary social custom and requirements, as well as experience of motion study.
3. Materials—a detailed knowledge of a vast and ever-growing number of widely diverse industries.
4. Engineering methods—a diverse and yet highly specialized study.

The basis for design and planning should be to make housework a pleasure and not a dreary, uninteresting necessity. Homes must be planned not only to save time and labour, but to increase leisure and provide the surroundings in which to enjoy that leisure. In a word, the home must be "liveable-in." The so-called class problem may have been a contributory cause of bad planning and lack of essential equipment in the past, but this war has largely removed this obstacle. The lack of servants, need for economy in money and material, and absence of free time no longer affect only one class, but are almost universal. One has only to look at the hands of a woman to-day, whether she comes from Altrincham or Hulme, to appreciate this. The unprecedented conscription of women to industry in this war has given many of them for the first time in their lives some inkling of the possibilities of science and planning in the home, and the comfort our industrial potentialities could and should bring. When after the war women are able again to join their husbands or marry and start a home, they will demand a home to live in, in the true sense of the word.

The future of this country depends on its children, the surroundings they grow up in, the education they will receive, not forgetting the very important part played by early parental influence. Yet we cannot expect a mother to give her children sufficient and adequate care, and that in the right spirit, if she is harassed, overburdened, and worried, and her health impaired by living and working conditions. Dame Janet Campbell, in the introduction to *Working Class Wives* by Margery Spring Rice, states: "The health and happiness of the working married woman are clearly of great importance in considering national health as a whole. She has to bear a heavy burden of physical work and mental responsibility. On her depends very largely the success or otherwise of the family life of the greater part of our population. Comparatively few people realize the long hours of monotonous, unrelieved domestic drudgery needed to keep her home and surroundings clean and wholesome, to buy and prepare food, and to attend to the manifold wants of her husband and children in sickness and health. Fewer still appreciate fully the effects on a woman's health and mental outlook of the incessant struggle needed to stretch an inadequate income to its utmost limits, and of her restricted environment and the scanty opportunities for recreation or social intercourse during the small amount of leisure she is able to snatch from her

* Paper at a Joint Meeting of the Manchester and District Junior Gas Association and the Lancashire District Gas Salesmen's Circle on March 27.

daily toil. It is often heartbreaking to see how rapidly a pretty, attractive girl grows old and drab after a few years of marriage. She loses her looks and ceases to take a pride in her appearance; minor ailments are neglected, her temper is frayed, and household worries weigh unnecessarily heavy. . . . At the same time there is an imperative obligation upon our social system to do more to relieve and rationalize the domestic slavery under which many women live (for it is nothing less), by offering better municipal or communal services to the housewife, and by educating at least the younger women to make intelligent use of them." Much of the housewife's time is spent in the daily routine of running a home, a task which mainly revolves around the preparation of food and washing of clothes. The kitchen and the bathroom are her workshops.

These essential necessities of life should lead and guide the efforts of the planner, engineer and administrator, when designing the home. Briefly, one must be able to: (1) Cook, (2) wash-up, (3) bathe, (4) launder and carry out the housework, and (5) look after the children. It should be possible to do all this in light, warm, and airy conditions, and at the same time with the minimum of effort and in the shortest space of time. This result will only be achieved by the collaboration of everyone concerned. Let us also start planning our new homes, not by first fixing the positions of the walls and then filling the enclosed space, but by determining the actual requirements, and then making the exterior fit the interior, so to speak.

Perhaps we can now try to apply these basic principles and see what they imply in terms of just one of the problems in which we are interested—namely, hot water. Whatever the means used for heating the water, that process should be completely automatic and, from the consumer's viewpoint, trouble-free. This means that the user of the appliance should not be required to give it constant attention, and not have to "budget the consumption" in order to have some hot water available for any unforeseen requirement. In addition, the appliance must be modern in appearance and harmonize with the kitchen. It must as a complete installation be within the means of families in the lower income groups. It is equally important that the maintenance and running costs should also be within the means of this class of user. At the same time the appliance must be economical from the national aspect in the fuel used. What sort of fuel should be chosen to fulfil these manifold requirements? The answer to this question will depend on many factors, the type of demand which will be made, and the fuels which are economically available.

In the past there has been intense competition, sometimes "cut-throat" it would seem, between all types of fuel, regardless of national economy or consumers' interests. It is time we took stock of our fuel position and planned the use of our resources to the best advantage. We must also try to utilize as efficiently as possible the existing machinery for the distribution of the various kinds of fuel. The investments in fue-ldistributing plants, not only in terms of money, but also in material and labour, are very considerable. Fresh plants or additions to existing plants may be very hard to obtain after the war. Some of the material must be imported, and the demands both of material and labour for rebuilding will be very heavy and urgent.

Fuel planning will also be influenced by considerations of hygiene and air pollution. The smoke from the enormous quantities of raw coal burnt in this country has caused immense deterioration of property and had an incalculable ill effect on the national health. If you consider parallel with these factors the (economically wasteful) methods which have to be adopted for the distribution of this fuel in the individual small quantities in which it is used, you will certainly agree that there is an enormous scope for national economy and common planning.

To-day we are controlling all our resources either voluntarily or under Government guidance, but there is still complete freedom of choice of fuel. It is not a little surprising when we consider the difficult mining situation. It may be argued that this freedom of choice is one of the tokens of that freedom for which we are fighting, but future generations may be of the opinion that we have been over-generous to the verge of licence in this particular. Free competition was and still is a great spur to technical advancement, but this technical advancement can sometimes get carried off the right track by reason of commercial competition or greed. We all know of one example of such competition, how one industry endeavoured to cut across the field of its competitors, even going to the length of using artificial tariffs and costs, financing this venture from its monopoly in other fields.

Our fuel planning must also depend on the availability of the various fuels in different areas. Where we find that it will be uneconomic to supply either gas or electricity, then we must be prepared to make the best of the still less efficient coal-burning appliance.

It may be asked whether the particular problem uppermost in mind —that is, hot water supply—is of sufficient magnitude to warrant such careful consideration of general fuel planning. Here are a few figures. Approximately 75% of the heat requirements of an average household is used for providing hot water. This assumes of course a minimum hygienic and social standard—to which those thousands of homes which have as yet no adequate means of hot-water supply must be raised. A considerable shortage of houses existed in this country long before the 1914–1918 War. Great efforts to improve this situation are required after this war if we are honest in our desire for a reasonable all-round standard of living. The Government will have to sponsor large scale building programmes, to assist the re-adjustment of industry to peacetime conditions. Naturally such a programme will have to give priority to the more urgent need of reconstruction of existing houses. It is not difficult to visualize, however, a building programme increasing to some 600,000 houses annually within five years after the war. It will probably then decrease over the following ten or fifteen years to normal replacement requirements. Every one of these houses must have as an essential part of its equipment some means of providing ample supplies of hot water economically and cheaply.

Is it unreasonable to suggest that the hot water installations in our new post-war houses should be of the highest standard, and embody the latest technical refinements which present-day development can provide? Seeing these installations, people who have for years suffered through the inadequacy of the provision for this essential requirement of the home will demand such modern equipment. We can, therefore, expect a large proportion of the old, out-of-date installations to be scrapped and substituted by a more efficient means of hot-water supply. The number of installations falling into this category is estimated at many millions. Take these with the normal annual replacements, and it would seem probable that nearly 1¼ million water heaters of one type or other—gas, electric, or solid fuel fired—will be needed annually in the first post-war period.

We cannot foresee which organization will be made responsible for fuel planning after the war. Yet surely we may safely conclude that gas will be called on to carry the major part of the hot water load. The requirements which have not been met in the past are of such magnitude that even if we extend the programme to deal with them over a considerable number of years—in accordance with capital, material, and labour available—this annual increase of the gas load will surpass anything known in the past.

Throughout all our planning and designing it should be remembered that we have to provide facilities for a population 90% of which earned before the war less than £250 per annum. No one can foresee the after-war development of income, production costs and living costs, and their ramifications and relationships. But we can accept this figure as a guide.

Flats, which may have to be erected in large numbers for families in the lower income group, pose a problem which requires further investigation. It is by no means certain that the centralization of a large number of homes in one building leads necessarily to a centralization of the hot-water production. It has been proved that the lowest economic unit for central hot-water heating by coke is 50 flats. Further, the lower the incomes the more the people are, it would seem, interested in controlling and selecting their expenditures themselves to their own liking or requirements, and often refuse to pay an average rate for any common supply.

When such cardinal issues are at stake it would have been abusing your attention and time to bring to discussion items which, however important they may have seemed in normal routine and business, are only of secondary importance now. I have tried instead to give some idea of the magnitude of the post-war problem with which we will be faced. It is a problem no single individual or combine can shoulder, one which will certainly require the pooling of all our resources and efforts. Yet there is no doubt that we should start in good time to forget our individual difficulties—sometimes historical ones—and to bury old grievances which may have survived the time of uncontrolled competition. If we do this, we shall succeed in making the best and most rational use, not only of our fuel supplies, material, and manpower. We shall also contribute in our particular sphere to ensure that in the future Great Britain's houses will be the best and happiest "homes." Mr. Churchill, in his speech of March 21 on Post-War Policy, referred to the spacious domain of public health. It will be our privilege to contribute in no small measure to this aspect of the national polity.

Summarizing, I have attempted in this Paper to clarify some fundamental characteristics of our everyday life and to trace them back to their proper origins. The professions responsible for the provision of the requirements of our daily life have obviously not been completely successful in their efforts. Although our function as gas engineers or gas salesmen lies in the making and distribution of gas and the making and selling of appliances, we must be aware that the consequences of our activity have a great influence on the physical and mental well-being of the public in unsuspected ways. We can only carry this responsibility if we have a thorough knowledge of the whole field of our subject. Only lack of knowledge could have produced such one-sided reports as those of—

> The Royal College of Physicians of London Memorandum, drawn up at the request of the Central Housing Advisory Committee of the Ministry of Health.
>
> The Plumbing Committee of the Ministry of Works and Planning.
>
> The Joint Committee of Working Women's Organizations, and
>
> The Women's Advisory Housing Council.

The Gas Industry, although it is one of the oldest industries, is still far from the peak of its development. The expansion in the past has always been in step with the accelerated development of appliances and means of bringing gas service to the home. Technical advances, such as desulphurization, standardization of calorific values, and improved techniques of manufacture, management, and adminis-

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ation, will contribute much to the further growth and advancement f the Industry.

Appreciating the great national importance of the Gas Industry, reater efforts should be made to attract the rising generation to take positions in technical offices, sales offices, and all branches of management, for instance, engineers, chemists, accountants, administrators, and merchandizers. This can only be achieved if the salaries offered are in step with other industries.

THE BEVERIDGE REPORT*

WITH SPECIAL REFERENCE TO PENSIONS AND WORKMEN'S COMPENSATION

By HENRY LESSER, O.B.E., LL.B.

(*Continued from p. 436*)

Workmen's Compensation

Now a word as to Workmen's Compensation. The suggestion is hat for the first 13 weeks of incapacity injury by accident arising out f and in the course of employment should for the purpose of benefit e treated in the same way as ordinary illness. After that period the njured man would receive an industrial pension as it is called at the ate of two-thirds of his earnings, subject to a minimum of not less han the benefit he would have received for ordinary disability, with a naximum of £3 a week. There would be no difference in this maximum rate for married and single men, but, of course, the normal hildren's allowances would be payable. A proportion of the industrial pension would be awarded for partial disablement. If death results from industrial accident or disease a lump sum grant (of an amount to be fixed) would be paid to the widow or dependents in addition to funeral grant and widows' and guardians' benefit. Lump sum payments for disability would practically disappear except where for special reasons such a payment would be in the interest of the claimant.

In regard to the cost it is proposed that, in part, the risks should be pooled and covered by the ordinary flat-rate weekly insurance contribution, but a special levy would be made on employers in industries scheduled as having materially more than the normal risk of accident or disease in industry as a whole. According to the Government Actuary the insurance contribution for a man would amount to 2.8d. per week, divisible equally between the worker and his employer, while the grant from the State would be .5d. a week. These contributions would produce £9.9 millions a year, leaving £5.1 millions to be met by the levy. For the purpose of his estimates the Government Actuary assumes that "hazardous" industries are those with a claim rate of more than 3½% of employees. It is not known what is the average rate of accident for the Gas Industry as a whole, but in the South Metropolitan Gas Company the rate over the past five years is a little over 3¼%, so that we would be just within the non-hazardous line, but if the average for the Industry as a whole exceeded the 3½% we should probably lose our immunity from the excess payment.

In regard to the administration of this part of the scheme, Sir William Beveridge proposes that there shall be set up, *at least* in every industry scheduled as hazardous, a Statutory Association of employers and employees with the following functions:

(*a*) Promotion of safety.
(*b*) Promotion of measures for rehabilitation and re-employment.
(*c*) Advice on making of regulations.
(*d*) Collecting the levy in accordance with a scheme prepared by the association and approved by the Ministry of Social Security.

Apart from these special functions, industrial disability benefits would be administered entirely by the Ministry of Social Security. Certified schemes contracting out of the Workmen's Compensation Act would disappear.

That concisely is Sir William Beveridge's Plan for superseding Workmen's Compensation, but, as he admits, several important considerations remain for discussion and settlement. The administration of this benefit would certainly not be so simple as it seems. Having regard to the provision of industrial pensions after the 13 weeks' incapacity, cases of alleged industrial accident would require careful investigation; and it is difficult to see what part the Social Security Officers would take in this respect. Are they to assist the insured persons by initiating civil proceedings against the employer, or to investigate cases of, say, defective plant or breach of statutory duty under the Factory Act, or, as under the Personal Injuries Act and the National Insurance Act, to bring coercive pressure to bear on the insured person to recover damages where third parties are involved? Sir William regards it as desirable from the point of view of social policy—

> "to remove provision for the consequence of industrial hazards from the arena of litigation and conflict between the parties to production, so far as this can be done without condoning reprehensible carelessness by the employer,"

but he thinks a review of the law of employers' liability is "a natural corollary of making this provision." Does this mean that the present common law liability for negligence and the well-known doctrine of common employment are to go?

Parliament, of course, is always most reluctant to alter the common law which enshrines the fundamental liberties of the British people. But if the industrial relationship of employer and employed is to receive a new status with rights and obligations peculiar to itself—as in the case of the marriage contract—it might well be that alternative remedies now available would disappear so far as any claim for damages is concerned; even if there were no such civil liabilities resting on the employer, official procedure under the new proposals might well disclose facts which would render him liable to penalties under the Factory Act. You have only to think of the increased growth in recent years of statutory regulations in regard to machinery and industrial processes to realize how odious such a bureaucratic system of enquiry might become if it were part of the normal procedure in determining title to disability benefit. This only shows how any proposed modification of one branch of legislation has to be considered in relation to some other branch of law, and how important it is that industry should be carefully advised in such matters.

Apparently the Government were not unmindful of these problems, since the Lord President of the Council announced in the course of the debate in the House of Commons that this particular part of the plan called for further consideration. This statement was supplemented by the Home Secretary, who said: "I would like to clean up that business while I am at the Home Office, because I feel that the whole administrative and legal structure is somewhat out of date." What legislative changes this portends I should not like to prophesy, but no doubt fresh light will in due course be thrown on the subject.

Basic Principles in Relation to Other Benefits

Now, Gentlemen, having dealt with Pensions and Workmen's Compensation, may I deal shortly with the basic principles of the scheme, and illustrate their operation by reference to the conditions governing certain other benefits with a view to indicating their possible effect on our industrial organization.

Beveridge points out that his plan is a "new type of human institution" in which the rights and obligations of the persons insured differ from anything to be found in any other insurance scheme in the world—voluntary or social. What apparently he means is this: The benefits to which an insured person is entitled as of right by virtue only of his contributions are one thing; the duties he owes to the community as an obligation of citizenship in return for the privileges he enjoys are another. Sir William merges these two principles into one scheme, and makes the State guarantee the benefits on condition that after a limited period the insured person surrenders to some extent his personal liberty. This is certainly something new to the accepted idea of insurance. For example, in paragraph 129 Sir William declares "that the rates both for unemployment and for disability should continue without diminution so long as unemployment or disability lasts." That is categorical enough. But later he says, "Getting work or getting well may involve change of habits, doing something that is unfamiliar or leaving one's friends, or making a painful effort of some other kind." On this principle he arrives at the conclusion that conditions imposed on benefits must be enforced where necessary by suitable penalties. But he does not say what those penalties are to be. This proposal is certainly a new and bold experiment in democracy.

Unemployment Benefit

Take, for example, unemployment benefit. The Beveridge proposal is that as a general rule benefit shall be payable as of right for six months. After that the insured person must attend a training centre. The question arises: For what work is he to be trained and where? The answer is: For such work and in such place as a Government official considers reasonable. But, you may ask, if the insured person (man or woman) is unwilling to leave home and family and friends, is unemployment benefit to cease—benefit which is said to be payable "so long as unemployment lasts"? The answer seems to be—yes. Then presumably having forfeited his insurance rights the insured person would have to apply for national assistance which is subject to a needs test—not yet defined. But if national assistance is payable at the subsistence level, that would compensate the unemployed person for the forfeiture of his insurance benefit. Therefore there must be a *penalty* of some other kind, and the word "penalty" usually connotes fine or imprisonment. This arrangement might perhaps work well when employment generally is good throughout the country, but would break down in times of serious and prolonged trade depression, and the taxpayer would be left with a very serious financial liability if benefit is to be paid as of right, for you should remember that in the average case of, say, a married man with two children, the rate of benefit plus children's allowances would be 56s. a week. Hence the importance of realizing Sir William's third assumption, namely the avoidance of mass unemployment.

(*To be continued*)

* Paper to the Southern Association of Gas Engineers and Managers, March 26.

Gas Products Prices

The London Market April 12.

All Coal Tar Products are in good demand, and Pitch in the London area remains about 45s.

The Provinces April 12.

The average prices of gas-works products during the week were: Pitch and Crude Tar,* Toluole, naked, North, 90's, 1s. 10d., pure, 2s. 5d. (controlled by the Control of Toluene No. 2 Order, July 3, 1941, which fixes the maximum price at which this material may be sold). Naphtha and Xylol controlled by the Coal Tar, Naphtha, and Xylol Order, 1942, dated Dec. 7, 1942, and operative from Dec. 21. Carbolic acid, 60's, naphthalene, and anthracene controlled by the Coal Tar Products Prices Order S. R. & O. 2509, dated Dec. 7, 1942, and operative from Jan. 1, 1943. Filtered heavy oil (min. gr. 1,080), 7¼d. to 8d. Creosote oil has been generally controlled as to direction and price for some time past. Current value—fuel grades 5d. to 5¼d.; timber preservation and other purposes 4¾d. to 6d.

* In regard to pitch and crude tar prices we would ask readers to refer to the editorial note on p. 396 of the "JOURNAL" for Sept. 10, 1941.

Tar Products in Scotland April 10.

Market continues very active. Refined t controlled. Value is 4½d. per gallon Works, naked. Creosote oil: Specificati oil, 6½d. to 7d. ; low gravity, 7¼d. to 7½d. neutral oil, 6d. to 6½d.; hydrogenation o 5⅞d. per gallon; all *ex* Works in bulk. Refine cresylic acid is in good call at 3s. 6d. to 4s. 6 per gallon *ex* Works, naked, according t quality. Crude naphtha: 6½d. to 7d. per gallon Solvent naphtha: Basic prices delivered i bulk, 90/160 grade 2s. 8d., and 90/1 Heavy naphtha, Unrectified, 1s. 10½d.; Rec fied, 2s. 3d. per gallon. Pyridine: 90/160 grad 13s., and 90/140 grade, 15s. per gallon.

Gas Stocks and Shares

The stock markets were again firm throughout last week. Budget fears caused a little irregularity amongst industrials, although there was a certain amount of selective buying in this section. Rand goldmining shares were again the outstanding feature.

Business in gas stocks and shares was a little heavier and prices continued to move up. In contrast to the past few weeks when fixed-interest stocks made the best showing, "ordinaries" were in demand last week, and it will be seen that a number of these recorded good increases, the most noticeable being the sharp rise in Preston "A" and "B" stocks at the Liverpool Exchange.

The following price changes took place during the week:

SUPPLEMENTARY LIST

Cambridge "B"	135—140	+3
Croydon 4 p.c. Deb.	98—103	+1

PROVINCIAL EXCHANGES

Bristol 2nd 4 p.c. Deb.	101½—103½	+1
Hartlepool Ord.	83—85	−1
Liverpool Ord.	104—105	+½
Newcastle Units	23/—23/6	+/−6d.
Ditto 4 p.c. Pref.	94—95	+½
Preston "A"	167—169	+13
" "B"	124—127	+12½

OFFICIAL LIST

Alliance & Dublin	83—88	−4
Associated Gas & Water Undertakings 4 p.c. Red. Cum. Pref.	19/6—20/6	+/6d
Barnet Ord.	150—155	+5
Bournemouth 4 p.c. Deb.	105—110	+3
Brighton Cons.	81—86	+1
Commercial Ord.	57—62	+1
Croydon Sliding Scale	120—125	+5
Imperial Continental	78—83	+1
Portsmouth Cons.	107—112	+2
South-Eastern Gas Corporation Ord.	18/—19/-	+/3d
South Metropolitan 3 p.c. Deb.	83—88	+1
Tottenham Ord.	103—108	+3
United Kingdom Gas Corporation Ord.	19/3—20/3	+/3d
Wandsworth Cons. 4 p.c. Deb.	104—109	+2
Ditto 4 p.c. Deb.	98—103	+3

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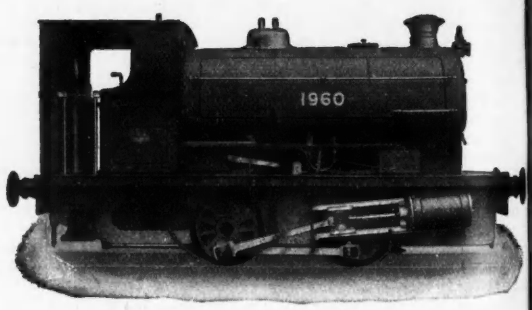
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